

LESSON OF THE MONTH

Suppurative polyarthrititis following a rat bite

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CASE REPORT

A 62 year old healthy Chinese man was admitted to hospital three weeks after a rat bit his left foot. Four days after the bite he developed pain over his left foot followed by pain and swelling in both knees, elbows, wrists, the small joints of both hands, and the left ankle. He had no fever or constitutional symptoms.

On admission he was febrile and jaundiced. His blood pressure was 110/70 mm Hg. No cardiac murmurs were heard. There was no right hypochondrial tenderness or hepatomegaly. There was synovitis affecting his wrists, interphalangeal and metacarpophalangeal joints of the hands, effusions in his right knee, right ankle, and left midtarsal joint (fig 1).

His haemoglobin was 125 g/l, white cell count $29.3 \times 10^9/l$ with 90% polymorphs, platelet count $621 \times 10^9/l$. The C reactive protein was 197 mg/l. Renal function was normal. Liver function tests showed a cholestatic hepatitis with serum bilirubin 55 $\mu\text{mol/l}$, alkaline phosphatase 399 U/l, alanine aminotransferase 230 U/l, and aspartate aminotransferase 63 U/l. Hepatitis B and C serology findings were negative.

Pus, aspirated from the right knee, contained 90 000 white cells/ μl with 98% polymorphs. The Gram stain showed regular Gram negative intracellular bacilli. With the history and the Gram stain finding, both the microbiologist and rheumatologist were alerted to the possibility of streptobacillary septic arthritis.

Oral ciprofloxacin and doxycycline were empirically started as the patient had a history suggestive of type I hypersensitivity to penicillin. This was changed to high dose intravenous penicillin G 18 million units a day when skin tests to penicilloyl polylysine and penicillin G were subsequently found to be negative.

Specific culture requirements were used and small grey colonies were seen after 48 hours' incubation on chocolate agar in 8% carbon dioxide and on CDC agar incubated in anaerobic conditions. In contrast with the appearance of the

organism in the Gram stain of the knee aspirate, the Gram stain of the colonies showed filamentous cells with many bulbous swellings (fig 2) typical of *Streptobacillus moniliformis*. The organism was negative to oxidase, catalase, nitrate, urea, and indole. It was sensitive to penicillin and tetracycline. There was no growth of pathogens from the blood cultures.

As his fever persisted, the affected joints were again aspirated with no further growth of pathogens. A transthoracic echocardiogram showed mild to moderate mitral regurgitation with no vegetations. He completed four weeks' treatment with intravenous penicillin with resolution of the arthritis, fever, and hepatitis.

DISCUSSION

Groups at risk for septic arthritis include the elderly, immunocompromised, or those with diabetes mellitus, rheumatoid arthritis, recent joint surgery, and prosthetic joints. Although *Staphylococcus aureus* is the most commonly implicated organism, certain pathogens are associated with specific at-risk groups; for example, Gram negative bacteria in the elderly and immunocompromised, anaerobes in patients with diabetes and patients with prosthetic joints, and salmonella in patients with systemic lupus erythematosus. In those with no apparent risk factors, a history of occupational, recreational, or incidental exposure to animal and rodent bites or scratches should be sought, as in our patient.

In published American reports, *S moniliformis* accounts for most cases of rat bite fever (RBF). In contrast, *Spirillum* RBF (also called sodoku) occurs world wide but is most common in Asia. *S moniliformis* is a saprophyte of the rat's rhinopharynx. Although human streptobacillosis is widely reported in Europe and North America, there has only been one report from southeast Asia.¹ It is commonly transmitted to man by a bite or scratch of a rodent. Cases in laboratory workers, and food-borne outbreaks through the ingestion of food or water



Figure 1 Synovitis of the right ankle and left midtarsal joint with the site of the rat bite (circled), which has healed.

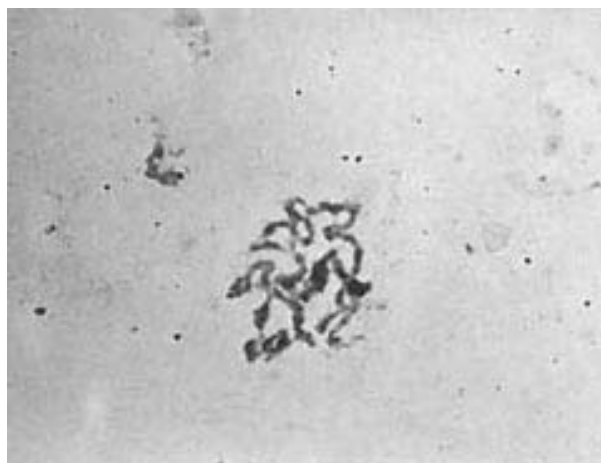


Figure 2 Gram stain of the colonies showing filamentous cells with many bulbous swellings typical of *Streptobacillus moniliformis*.

contaminated with rat faeces, have also been reported, including two large outbreaks of Haverhill fever world wide from contaminated raw milk.^{2,3} The youngest reported case of RBF was in a 2 month old infant⁴ and the oldest a 79 year old farmer.⁵

The incubation period for *S moniliformis* RBF can range from 1 to 22 days but the onset of symptoms usually occurs 2–10 days after the rat bite. It is usually characterised by an irregularly relapsing fever, occasionally associated with headache, nausea, vomiting, arthralgia, myalgia, and lymphadenopathy. This is followed within 2–4 days by a maculopapular, purpuric, pustular, or petechial rash on the extremities, palms, and soles. The wound from the bite heals spontaneously. The absence of a history of a rat bite may result in delayed diagnosis.^{5,6}

Streptobacillosis is an uncommon cause of septic arthritis. This is often acute or subacute in onset, affecting both children and adults. Monoarthritis of the hip,^{7,8} asymmetric oligoarthritis,^{9,10} and symmetric polyarthritis^{11,12} affecting the small joints of the hands, elbows, wrists, and knees have been reported. Monoarticular involvement of the sternoclavicular joint in the presence of streptobacillary endocarditis, has also been reported.¹³ The arthritis, which may either be suppurative^{7–11} or non-suppurative, rarely occurs in the absence of other cutaneous or systemic manifestations of RBF.⁸

Human streptobacillosis usually has a good prognosis after appropriate antibiotic treatment. Although most cases resolve within two weeks, 13% of untreated cases are fatal. Complications include endocarditis, myocarditis, pericarditis, interstitial pneumonitis, amnionitis, prostatitis, pancreatitis, and abscesses in a variety of organs including the liver and spleen.¹⁴ Endocarditis,¹³ although exceptionally rare, occurs most often on previously damaged heart valves, with an overall mortality of 53%. Major embolic phenomena have not been reported.

S moniliformis is characterised by strict growth requirements and slow growth, making it difficult to culture. Although the laboratory diagnosis is usually made from blood cultures, it has been isolated from synovial fluid, as in this case. If *S moniliformis* is suspected, the laboratory should be consulted early to ensure appropriate culture media are used. This will also help the laboratory to identify what may otherwise be reported as an “unidentified Gram negative bacillus”. Specimens are ideally inoculated onto media supplemented with blood, serum, ascitic or synovial fluid and incubated in an atmosphere with 5–10% carbon dioxide. Growth of the organism in commercial blood culture systems is inhibited by the presence of sodium polyanethol sulphonate.^{15,16} Our patient's blood was inoculated into such a system. The use of polymerase chain reaction amplification of part of the 16S rRNA gene of *S moniliformis* followed by sequencing in the diagnosis of two recent cases has been reported.^{17,18}

S moniliformis is susceptible to penicillin. In uncomplicated cases, recommended treatment is oral penicillin or intravenous penicillin G 600 000 units every six hours for 10–14 days. Reported cases of septic arthritis have been treated with intravenous penicillin for a duration of 10 days to six weeks. The addition of streptomycin has been advocated to enhance activity against cell wall deficient L forms. Erythromycin, chloramphenicol, clindamycin, cephalosporins, and ciprofloxacin have been tried with variable success. The efficacy of

prophylactic antibiotic treatment against RBF following a rodent bite is unknown. Repeated arthrocentesis, arthrotomy, and joint lavage may be required in cases with rapid, recurrent accumulation of pus or in deep seated joints like the hip.⁸

THE LESSONS

- A history of occupational, recreational, or incidental exposure to animal and rodent bites or scratches should be sought, especially in cases of septic arthritis with no apparent risk factors.
- Successful culture and identification of pathogens in septic arthritis may sometimes require close consultation between the clinician and the microbiologist.

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